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A new regime in Finnish fisheries management – Evaluating the individual quota system for the commercial herring and sprat fisheries through stakeholder interviews

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Tiivistelmä – Referat – Abstract

An increasing number of fisheries utilize rights-based management approaches for achieving economic, social and environmental sustainability. It is widely accepted that fisheries management is to a large extent about managing human behaviour, hence social acceptance is prerequisite for a successful management regime. Based on stakeholder interviews, this study analyses the opinions related to the recently implemented individual transferable quota (ITQ) system for the Finnish herring and sprat fisheries. Similarly, opinions were collected in 2007 by Kulmala et al. related to a possible implementation of ITQs, thus creating a unique opportunity to compile results from both a pre and post individual quota management implementation scenario. In 2007, it was suggested that fishers would largely support an ITQ system in Finland. Accordingly, this study implies that most of the Finnish stakeholders are content with the properties of the new system, however inequalities were perceived among fishers targeting fish for human consumption. In general, the system is expected to achieve its primary goal of improved economic efficiency within the fishery industry.

Avainsanat – Nyckelord – Keywords

Individual transferable quota (ITQ), Transferable fishing concessions (TFC), Fisheries management, Rights-based management, Stakeholder involvement, Baltic herring, Sprat

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En ny era för fiskeförvaltningen i Finland – Evaluering av det individuella kvotsystemet för det kommersiella strömmings- och vassbuksfisket genom intervjuer med intressenter

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Tiivistelmä – Referat – Abstract

I regleringen av kommersiellt fiske utnyttjas till en allt bredare grad rättighetsbaserade förvaltnings metoder för att uppnå ekonomisk, social och miljömässig hållbarhet. Det är allmänt godkänt att fiskeriförvaltning till en stor grad handlar om att reglera människans beteende, därmed är social acceptans en nödvändig förutsättning för en framgångsrik fiskeriförvaltning. Genom intervjuer med intressenter, analyserar denna studie åsikter kring de individuella överförbara fiskerättigheterna som nyligen implementerades för det kommersiella strömmings- och vassbuksfisket i Finland. Kulmala et al. samlade år 2007 in åsikter om en möjlig introduktion av de individuella överförbara fiskerättigheterna, vilket ger en unik möjlighet att sammanställa resultaten från både före och efter implementationen av den nya fiskeriförvaltningen. År 2007 indikerade resultatet att största delen av de finska yrkesfiskarna skulle stöda en introduktion av individuella överförbara nyttjanderättigheter. I enlighet med det, antyder denna studie att största delen av intressenterna är nöjda med egenskaperna kring det nya systemet, men att ojämlikheter upplevs framför allt bland fiskare som fiskar fisk för mänsklig konsumtion. Generellt förväntas systemet nå sitt primära mål med att öka på lönsamheten inom fiskenäringen.

Avainsanat – Nyckelord – Keywords

Individuella överförbara fiskerättigheter (ITQ), Överlåtbara nyttjanderätter (TFC), Fiskeriförvaltning, Rättighetsbaserad förvaltning, Intressenters medverkan, Strömming, Vassbuk

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1 Introduction

Fisheries have long been subject to inadequate management and there is an obvious room for improvement (Beddington et al., 2007). Fishery fleet overcapitalization is considered one of the key factors behind "the tragedy of the commons" (Hardin, 1968) and the resulting overfishing (FAO, 2016). There have been several suggestions how to overcome this problem, and among them, rights-based management (RBM) is one popular approach (Cunningham, 2005). There are two important movements that recently have taken place in the field of fisheries management (Beddington et al., 2007). The first one is the shift to ecosystem-based fisheries management (EBFM), which provides a holistic approach to the structure and interactions between fisheries and the ecosystem. The second important movement is the usage of economic incentives to motivate fishers to endure short-term sacrifices in pursuit of long-term benefits (Grafton et al., 2006). One of the most prominent RBM approaches is the Individual Transferable Quota (ITQ) system, which utilizes economic incentives in an effort to achieve sustainable fisheries. Since its first application in New Zealand, ITQs has gained an increasing amount of acceptance and a fair degree of success (Beddington et al., 2007; Cunningham, 2005; Grafton et al., 2006).

In the ITQ system, the quotas are seen as a commodity that gives the owner the right to fish a certain proportion of a certain species, thus eliminating the "race to fish" and enhancing the economic performance (Anderson et al., 2019; Birkenbach et al., 2017). Although the focus often is upon the economic viability of the ITQ system, it is important to remember that fisheries management is largely about managing human behaviour (Fulton et al., 2011; Hilborn, 2007; Larkin, 1978) rather than the fish stocks directly. Therefore, social acceptance and commitment is crucial for the successfulness of any management measure (Gutiérrez et al., 2011). Following the general recommendations of the European Common Fishery Policy (CFP) and to battle the declining economic efficiency (Guillen et al., 2018), Finland introduced an ITQ system in 2017 to manage the national commercial herring, sprat and salmon fisheries. It needs to be acknowledged that the quota system in Finland goes under the term TFC (transferable fishing concessions), as proposed by the European Commission, referring to the systems validity period being limited. However, this report will use the more general term ITQ.

In this study we conduct stakeholder interviews to obtain information regarding the opinions and prospects of the new management regime (Statsrådets förordning 1050/2016, 2016). The results are reflected upon a similar study conducted prior to the implementation of ITQs by Kulmala et al. (Kulmala et al., 2007), regarding fishers opinions of an ITQ system for the herring fishery in Finland. To our best knowledge, no prior study has utilized stakeholder information, obtained through personal interviews, to compile stakeholder opinions from both a pre- and post ITQ management implementation scenario.

Finnish fisheries have long battled with declining revenues and the number of commercial fishers has steadily declined, lately as a consequence of the high average age of fishers (Guillen et al., 2018). Finnish fisheries can roughly be divided into two different segments, substantially different from each other, large-scale trawling operating offshore and small-scale fishers operating along the coast among privately owned waters. Although trawling accounts for the major part of the total catch, coastal fishing still has an important socio-cultural value (Salmi, 2009a).

This study will focus on the herring and sprat fisheries, which accounts for the highest national landings, measured both in value and gross tonnage (Natural Resource Institute, LUKE, 2019a). The primary purpose is to obtain opinions of the recently implemented management system and expectations for the future. Since acceptance is a prerequisite for a successful management regime, this knowledge will identify which objectives of the system have, or have not, successfully met acceptance from various stakeholders, and by doing so, generate an educated base for future developments. Through the information obtained from the interviews the Finnish ITQ system will be evaluated based on the same three target areas mentioned by both the Finnish managers and as stated in the EU Common Fishery Policy (CFP) (European Commission, 2016) to be fundamental elements of sustainability: economic, social and environmental.

The structure of the article is as follows: First, the theory and central concepts of ITQs as a fisheries management system will be presented, followed by some social aspects of the system. A brief overview of the upraise of Finnish commercial fisheries will provide the context according to which the Finnish ITQ system is modified. In the second part, the methodology and the interviews will be described. Further, the results of the interviews will be presented and finally concluded with a discussion.

1.1 Rights-based management and ITQ

In the effort of controlling the utilization of a common resource, economists have suggested the usage of Rights-Based Management (RBM) methods, with a general emphasise on the transferable quota system, to overcome the environmental and economic problems associated with fisheries (Arnason, 2009). For a fisher, owning a quota represents the right to fish a proportion of the TAC for a certain fish species, thus not privatising the fish stock itself, which will remain a common resource (Kronbak et al., 2014). There are a number of quota systems categorizes under the term RBM: Individual Quotas (IQ) and Individual Transferable Quotas (ITQ) allocated to individuals, Individual Vessel Quotas (IVQ) allocated to fishing vessels, Enterprise Allocations (EA) allocated to fishing corporations, Community Development Quotas (CDQ) allocated to groups or communities, and Territorial User Rights to Fish (TURF´s) allocated to a given geographical area (Arnason, 2009; Emery et al., 2012). Economists emphasise the importance of creating secure, durable and tradeable ownership rights, with a long enough time perspective, to increase economic efficency and profitability (Havice, 2013).

ITQs remove the issue connected with open access fisheries and various management instruments by removing the so-called "race to fish" (Grafton, 1996). This race can lead to poor stewardship and lobbying for higher TAC limits, creating a spiral of reduced stocks, unsustainable harvests, and eventually a collapse of the fishery (Costello et al., 2008). ITQs are calculated, by catch shares, from the annual TAC to the fishers, who can either choose to exercise their right to fish, lease the quota share or sell it (Grainger and Costello, 2011). In doing so, it offers fishers an opportunity to optimize their level of input in order to optimise their output, i.e. it leads to both allocative and technical efficiency in terms of e.g. lower fuel and labour costs (Grafton et al., 2000). Perhaps the most important feature of ITQs is that the system generates a long-term economic incentive for fishers to practice sustainable fishing, since they are financially rewarded from the productivity of well-managed fish stocks (Emery et al., 2012). The underlying reasoning behind this can be found in the Gordon-Schaefer static model (Seijo et al., 1998), which indicates that maximum economic yield (MEY) can be achieved by fishing below the maximum sustainable yield (MSY) limit, i.e. in overexploited fisheries reduced effort from MSY level would increase revenues (Christensen, 2010). The ITQ system guarantees the individual fisher a share of future catches, hence aligning the

individual incentives with the profit maximisation aims of the fleet. Ultimately, this allows the whole fleet to make rational economic decisions that optimise the individual economic yield, which accordingly will reduce the overcapacity in the fishing fleet (Beddington et al., 2007).

In addition to ITQs as an output control, fisheries management strategies commonly include various input controls, also known as safeguards. These include e.g. spatial and time restrictions, type and quantity of gear allowed, restrictions of quota transfers and bycatch control (Review Individual Fishing Quotas Committee, 1999), and are usually added to reach the EBFM requirements. However, in doing so the overall incentive structure might be weakened, since fishers confident in future long-term benefits might be decreased along with more regulative inputs (Emery et al., 2012).

In addition to the ITQ system being criticised for being too inflexible to meet EBFM goals, ITQs have also been criticised for some of its socio-cultural impacts (Copes, 1996; Copes and Charles, 2004; Young et al., 2018). The option to sell quotas through market mechanisms naturally leads to a concentration of the quotas to fewer and larger companies or fishers. This has been criticised as unfair for smaller operators since they might lack the financial possibilities to maintain their businesses at a profitable level, thus forced to sell their quotas (Olson, 2011). This is particularly true in cases where the national TAC limit have been reduced after the quota allocation, since it directly affects the fishers revenue (Pálsson and Helgason, 1995). Other criticised factors are e.g. reductions in employment, which effects stretches from an individual level to community level, reduced income for crew members, increase in social class distinctions and problems with equity and justice issues (Acheson et al., 2015; Olson, 2011). A change in the management regime will undoubtedly impact many different stakeholders within the industry and will continue to reform the industry for several years before the system stabilizes (Arnason, 1996; Asche et al., 2014; Dewees, 1998).

1.2 Social dimensions of ITQs

It has become widely accepted that fisheries management is to a large extent about managing human behaviour, and so, in addition to understanding fish species biology and ecology, understanding the social and economic dynamics is considered equally important (Fulton et al., 2011). Accordingly, today's fisheries management systems are

a balance between market mechanisms and social objectives, as well as environmental aspects, and is in its nature a highly interdisciplinary field. According to a study comparing 130 fisheries worldwide (Gutiérrez et al., 2011), the most important attributes for a successful fisheries co-management system (i.e. cooperation between managers, fishers and scientists) are strong leadership, high social capital and an individual quota system.

Separating market mechanisms from social objectives might be a difficult task, as social and economic objectives often are closely entangled. Høst suggests in his book *The Economics of Market-Based Fisheries Management* (Høst, 2015), that fisheries are in fact a combination of different peoples with different values, thus forming different groups and communities in the society. Further adding, that safeguards are therefore developed to protect the interests of these different groups, which ultimately are properties that form the industry. Applying this thought into the context of rights-based fisheries management systems, ITQs provide the market mechanism for reaching a higher economic efficency, while national or regional safeguards protect the social interests of various groups within the society, e.g. safeguards for protecting small-scale fisheries.

The *Catch Share Design Manual* (Bonzon et al., 2013) lists common social and economic conditions within fisheries that have led to the implementation of a catch share programme (Table 1).

Table 1 Common drivers for creating an interest to implement a catch share program (Bonzon et al., 2013)

Economic Conditions	**Social Conditions**
• Declining revenues	• Exceedingly complictated regulations
• "Race for fish"	• Desire for increased stability and predictability
• Overcapatilized fleet	• Significant safety concerns
• Excess gear deployment	• Conflicts between different fishing sectors
• Buy-out under consideration	• Declining or unstable jobs
• Management costs exceeding revenues	

Catch share programmes, such as ITQs, are often implemented in fisheries that are already overcapitalized and/or during periods when catch limits are declining, making social objectives an essential issue for the fishers. However, fishers cannot rightfully be categorized as one group with the same social values but should rather be considered as small groups or individuals, all with their own social perspectives and values. Nonetheless, on a general level, the most important values for fishers are connected to the character and properties of the fishing fleet and community, as well as fairness and equity issues. (Bonzon et al., 2013).

1.3 Finnish fisheries

Fish as a commodity, has historically been an important source of income for the coastal population in Finland. The Finnish coast consists of a widespread archipelago, unique in the sense that most of the water areas are privately owned (Salmi and Varjopuro, 2001). The privatisation of both coastal and inland waters reaches back to the 18th century and was further enforced in 1902s fisheries legislation. The reform was based on the philosophy that local landowning farmers should be responsible for the commercial fishing and thereby the landless people's position, i.e. the majority of commercial fishers at that time, was weakened. This reform has continued to play a central role in the development of Finnish fisheries (Salmi and Salmi, 2010), e.g. creating conflicts between water owners, commercial fishers and recreational fishers targeting the same fish and sometimes even using the same methods (Salmi, 2009a).

Contrary to Sweden and Norway, where fisheries managed to form organisations securing political and economic support, Finnish fisheries lacked sufficient political support after the Second World War (Eklund, 1993). It was only in the late 1960s and during the 1970s, as a consequence of the growing mink fur industry, that the state started to financially support a modern infrastructure for the fishery industry (Eklund, 1994). The conflicts between landowning and landless fishers was still very present and in addition, an increasing interest from recreational fishers and summer cottage owners to utilize the water areas was seen. A complicated management system prevailed, with numerous passive management units and some areas lacking organised management (Salmi, 2012).

Finland joining the EU in 1995 meant stricter regulation and control of the fisheries. Adapting the EUs CFP and forming international agreements also transferred the decision making framework from regional communities to outside bodies (Salmi, 2012). The Finnish herring and sprat TAC limits are decided on an EU level. Prior to the individual quota allocation, the TAC was open for all registered commercial fishers to be utilized. This led to a situation of intensive race to fish, frequently forcing the management to stop or pause trawl fishing in midseason, only to be reopened again during autumn (Maa- ja metsätalousministeriö, 2002, 2001). This was done primarily for two different purposes, firstly to ensure small-scale coastal fisheries a part of the TAC, which fishing season usually last only from May to June, and secondly to ensure a part of TAC that was left for the winter season. This top-down management system was by many stakeholders considered inadequate for reaching economic, social and environmental sustainability (Kulmala et al., 2007) and Finnish fishers wished for a higher degree of influence on management (Ignatius et al., 2019). Thus, a shift of the management regime had long been debated.

Finnish fisheries targeting herring and sprat can roughly be divided into two separate segments, pelagic and deep mid-water trawling and coastal trap-net fishing. The bulk of the herring catch, some 96% of the total catch in 2017 (Jounela et al., 2018), is caught by the trawler fleet. The catch has been concentrated to a small number of vessels, of which lately a large portion have been transferred to foreign owners, e.g. Estonians (Natural Resource Institute, LUKE, 2019b). A large portion of the landings also take place in foreign ports, e.g. in Denmark and Sweden. Despite herring being one of the key commercial catch species in the Baltic Sea, only a fraction of it is used for human consumption, while the rest is used as fodder (Sarkki and Pihlajamäki, 2019). In recent years, due to strong herring stocks, the catch has increased, reaching its all-time high in 2016 (Guillen et al., 2018). However, simultaneously to the implementation of ITQs, the Finnish TAC limit for herring was significantly reduced. This might be a factor that affect fishers' perceptions of the ITQ system, although the event was purely coincidental.

The number of workers within Finnish fisheries have steadily decreased since the beginning of the 20th century. It is estimated that in 1901 the number of commercial fishers was at least 20,000 (Salmi, 2009b), whereas in 2017 the commercial fisher register comprised 2491 full and part-time fishers (Natural Resources Institute

Finland, Commercial marine fishery, 2018). Today, the average age of the active fishers is considered high and newcomers into the industry are few. The majority of the jobs are created from small-scale coastal fisheries, which is highly seasonal, thus mainly consists of part-time employment (Guillen et al., 2018). Although the importance of fisheries economics on national level has diminished, it is still of some importance on a regional level (Virtanen et al., 2001) and socio-culturally commercial fishing is still considered an important occupation (Ignatius et al., 2019; Salmi, 2009a). Recently, in the light of local food trends and eco-friendliness, herring in particular has been advertised for its health benefits as well as a method for removing nutrients from the Baltic Sea.

1.4 ITQs in Finland

According to the global trend of applying market mechanisms in fisheries management, Finland with its recent introduction of ITQs, became the last Nordic country to utilize market-based management methods for its fishery industry (Høst and Christiansen, 2018). The primary objective was to improve the economic efficiency of the fisheries, while social and environmental objectives were also considered important. During the planning phase, both stakeholder opinions and experiences from other countries were taken into consideration. The outcome was "*a collection of the best properties from ITQ systems abroad"* (quote from personal discussions). In Finland (excluding Åland islands), fishers are under the jurisdiction of the Ministry of Agriculture and Forestry, which was responsible for the implementation and allocation of the ITQs.

The individual quota system will initially cover three species; Baltic herring, sprat and salmon. The quota sizes were determined and allocated according to the principles of catch history, where the three best years of a five-year period were taken into account. Granted an ITQ, the fisher is obliged to utilize the quota received or risk losing it, in which case the ITQ will fall back to the state to be reallocated. As a novel attribute for ITQ systems, Finland is trying a new method for encouraging and offering an entrance point for new fishers to enter the industry. From the initial quota allocation, 4% of the TAC was reserved as non-transferable quotas for newcomers (Lag om det nationella genomförandet av Europeiska unionens gemensamma fiskeripolitik 1048/2016, 2016). These quotas are allocated for a five-year period, during which time the fisher

can acquire transferable rights from the market, thus reducing the exclusiveness and closedness of the system.

The law clearly stipulates that the quotas are considered user rights and that the resource is still owned by the Finnish state. The difference between property rights and user rights can also affect the quota holders perceived security of the system, since strictly speaking in user-rights nothing is owned and the future is somewhat unsecure (Grainger and Costello, 2011). The user rights were initially distributed for a period of ten years, with the possibility of prolonging it with a period of five years at a time. The rights will be re-evaluated every five years, so that the fishers will always have a five- to ten-year time perspective. This was decided in an effort to "*hinder the quota prices to sky rocket*" (quote from personal discussions). The herring fishing rights were divided between the two different fishing methods, in an effort to protect the small-scale coastal fisheries. It is not possible to fully transfer the right for trap-net fishing to a trawl fishing company. However, the annual quota can be transferred e.g. if the coastal fisher still has quota left after the trap-net season have ended. To prevent extensive quota concentration, the law also restricts one actor from owning more than 20% of the national quota for herring and sprat (15% for salmon).

2 Methods

A central theme in this research is the usage of social acceptance as a parameter for identifying a successful fisheries management system. To gain an adequate foundation for the understanding of the social challenges linked with the introduction of the ITQ system, a thorough literature review was conducted of studies from various fisheries having implemented ITQs. As ITQs are not a "one-size-fits-all" system, but modified according to a unique context, two discussions were held with the managers regarding the implementation process and system properties of the Finnish ITQ system. These discussions provided the context and the goals which the managers hope to achieve through the new system. The literature review and the management discussions form the base for the framework used when designing the interview questions (Appendix 1).

The interview participants covered six different stakeholder groups (see table 2); management, researcher, unions, interest groups (including fish processors and

sustainable fisheries promotors), commercial trawl and trap-net fishers. These groups were selected based on their role and interests in the Finnish herring and sprat fisheries and were directly or indirectly affected by the implementation of individual quotas. All 15 interviews where kept during the autumn in 2018 at locations selected by the interviewees. Initial contact was made through either a phone call or e-mail. The participants representing the fishers were selected to geographically cover different areas of the coast of Finland.

Table 2 Stakeholder groups and the number of interviews.

Stakeholder group	**Number of interviews**
Management	1
Researcher	1
Unions	3
Interest groups	4
Fishers (trawl)	3
Fishers (trap-net)	3

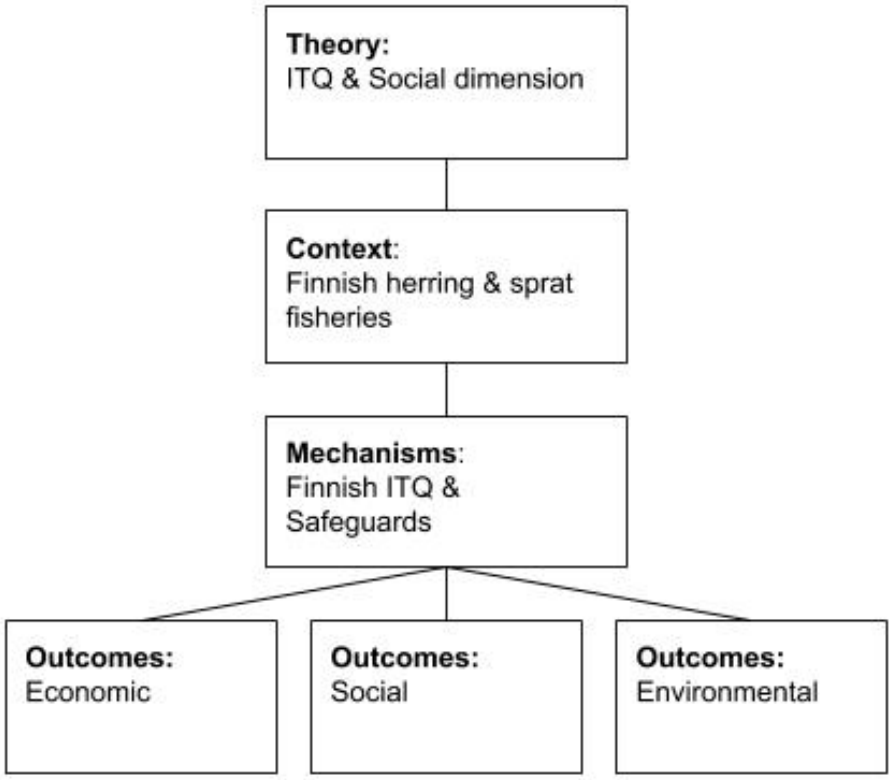
The semi-structured interviews consisted of 17 questions, covering various properties and characteristics of the Finnish ITQ system and future prospects of the industry. The interviews were designed to cover certain areas using open-ended questions which encouraged further discussions and contemplations. The interviews were audio recorded and transcribed using the software Express Scribe.

The interview transcripts were entered into Atlas.ti and coded using a thematic analysis approach. This process enables systematic categorization and identification of themes and patterns within the data (Boyatzis, 1998; Friese, 2019; Miles and Huberman, 1994). In the encoding process the categories identified in Kulmala et al. article (Kulmala et al., 2007) was utilized to obtain easy comparison.

In an effort to evaluate the successfulness of the implementation of the new fisheries management system in Finland, this study uses a realist evaluation approach. This

approach is a theory-driven evaluation process that consists of three main concepts: context, mechanisms and outcomes (CMO), which can also be expressed as *context + mechanism = outcome*, where mechanisms are the features of a system and context describes the conditions wherein the mechanisms operate (Pawson and Tilley, 1997). According to the aims of the Finnish ITQ system, as stated by the managers, the outcomes are divided in three different segments constituting the three pillars of sustainability: social, economic and environmental. A model of the CMO-approach in the context of Finnish herring and sprat fisheries can be seen in Figure 1.

Figure 1 Realist evaluation model of the Finnish herring and sprat fisheries.



As the new fisheries management system in Finland has only been applied for two years, data on changes in economic or environmental performances are limited, showcasing the importance of the findings from the interviews conducted in this research. To determine whether perceptions regarding the ITQ system have changed in Finland from the initial study in 2007 compared to the situation today, after the

implementation, the findings from the interviews were reflected upon the findings and conclusions made in the study conducted by Kulmala et al. (2007).

3 Results

The results presented below are the collected opinions of the ITQ system from various stakeholders in the Finnish herring and sprat fishery industry. The interviews covered different aspects of the ITQ system, the management and future prospects. For comparative reasons the interview questions are here divided into the same six categories utilized in Kulmala et al. (2007) study: (1) Opinions regarding the management, (2) Initial allocation, (3) Attributes of quotas, (4) Pros and cons of the ITQ system, (5) Quota savings, and (6) Future prospects. All quotes have been translated to English by the author from their original form in Finnish or Swedish.

3.1.1 Opinions regarding the management

Ten of the fifteen stakeholders were of the opinion that ITQs are the right management system for Finnish fisheries. All four opposing the system were fishers targeting herring for human consumption, of which three were trap-net fishers and one a trawl fisher. The common perception among the trap-net fishers were that they should have been left outside the ITQ system and been divided their own share of the TAC, from within they would have fished without individual quotas. This was seen as an option to secure the continuation of herring being caught for human food. On the other hand, most of the other stakeholders expressed their opinion that by separating trawl and trap-net fishers' quotas, and controlling the transferability in between, the continuity of trap-net fishers had been secured.

All stakeholders were of the opinion that herring and sprat fish stocks need to be managed, and the majority saw that it is best to have separate quotas for herring and sprat. A couple saw some benefits in combining them, especially in the main basin area, where sprat is often considered as a limiting factor when catching herring. One participant commented on the recent introduction of a clause allowing up to 9% of sprat caught as by-catch to be counted as herring:

"*to have different quotas have lost its meaning… Also allowing those who had not previously fished sprat, to start to do so… This was introduced after the initial quota (ITQ) allocation, messing things up a bit",* – Commercial fisher.

Similarly, a couple of stakeholders stated that they were happy with the introduction of ITQs, but that the managers should fully commit to the system, stop intervening, and allow the system to adjust according to the markets, as it is supposed to do. Although not specifically asked, a number of fishers mentioned an increase in surveillance when it comes to controlling overfishing and following quota limits.

The majority of the stakeholders did not find any notable differences in the way the system treats large and small, or trawl and trap-net, fishing companies. Comments were given that all follow the same rules and laws, thus have the same prerequisites for succeeding. Some concerns were expressed regarding trap-net fishers not having the same opportunities for selling their quotas in the future, since commercial trap-net fishers are getting fewer and the economy for investing is often quite limited in smaller fishing companies. Two of the trap-net fishers expressed that the inequality took place prior to the allocation, rather than now when the system is up and running.

3.1.2 Initial allocation

Like the division of stakeholders opposing the ITQ system, all commercial fishers targeting herring for human consumption (three trap-net and one trawl fisher) were unsatisfied with the quota allocation process. The trawl fisher was of the opinion that fodder fishers were favoured since they fish quantity rather than quality. Also pointing out the extra cost of now being forced to rent or buy more quotas to be able to fish the same amount as a few years back. However, simultaneously mentioning that the national TAC reduced by some 40% a couple of years back, naturally reducing the amount of catch the quota covers. The general perception among trap-net fishers was that they were not properly informed about the system, or them being part of the system, thus not given a chance to affect the results.

"*…trap-net fishers did not know how it was planned, trawl fishers knew, and they were able to manipulate their catch history…",* – Commercial fisher.

This apparently caused a lot of negative thoughts and bitterness among the trap-net fisher community. Most stakeholders had experienced or heard of instances where

the system had been played to gain a larger share of the rights prior to the allocation, especially among the trawl fishing community.

> "*The fishing did not make any economic sense at times, they were only fishing to maximise their history…",* – Commercial fisher.

The scientist was of the opinion that the quotas should have been divided through an auction, since fish is a natural resource that belongs to everyone. All other stakeholders saw the allocation process as the right option, some adding that it is not necessarily a perfect system, but the best available option.

> "*…do not believe a system that would be fair for everyone will ever be found… there will always be those who lose and those who win",* – Commercial fisher.

3.1.3 Attributes of quotas

Two general themes occurred whilst discussing changes within the fishery fleet. Firstly, the concentration of quotas to larger actors. This was however not seen as a negative impact of the quota system, but rather it was considered as a sign that the system is working properly. Secondly, the reduced race-to-fish was appreciated among all stakeholders, highlighting the possibility for long-term planning and increased flexibility. Generally, the attitudes within the industry had slightly improved along with the new system and signs of increased cooperation can be seen. The trap-net fishers had not noticed any significant concentration among their community, some fishers had quit but mainly due to high age and was as such given a welcomed "*retirement money"* after selling their quota rights. Damages caused by the seals and black cormorants were considered far bigger issues for the trap-net fishers. Regarding the law stating that one actor can possess a maximum of 20% of the national quotas, the common perception was that it is good to have a limit, however this limit was considered easily circumvented through strategic business planning.

> *"…it is possible to evade through strategic company structures, in which case it does not matter what the percentage is",* – Union

The time period of 10+5 years was mostly viewed as positive and a sufficient time span for fishing companies. Concerns among fishers towards the system was linked to

whether the system will continue or not, although not continuing was seen as unlikely, a certain confirmation of its continuity was wished for.

> *"If you apply an individual quota system, do it properly, why this in-between model?",* – Interest group

Equally, investments were also linked to the uncertainty of the systems future.

> "*If I invest money now into new quotas, what will happen after ten years, will all the money be wasted?",* – Commercial fisher

Nonetheless, the quota system was generally seen to have a positive effect on the quality of the fleet, allowing for more investments.

The transferability of quotas was seen as an important property of the system among most stakeholders. Concerns existed that more and more quotas are being transferred to foreign owners, however this development was already visible before the introduction of the quota system. Risk associated with buying more quotas was considered low, although drastic changes in the TAC limit was acknowledged to impact the stability. A slight risk was noted among trap-net fishing, given that the seal and black cormorant population would continue to increase. The fish stocks were considered healthy and all stakeholders were happy with the decreased dioxin levels. A common market channel, preferably online, for selling and buying quotas would by some be a welcomed supplement, while others saw no need for such as the fishers are few and the current system of personally contacting each other was considered sufficient.

3.1.4 Pros and cons of the ITQ system

Most of the stakeholders believed that the quota system will reflect positively on the economy of individual fishing businesses and the industry as a whole, although it was considered too early to know. Some of the positive factors mentioned was improved flexibility, cost-efficiency and improved cooperation possibilities. However, a couple of stakeholders also pointed out that there are several simultaneous factors affecting fisheries economics, e.g. global market prices for fishmeal, the Finnish fur industry and the recent loss of the Russian market, hence determining to which extent the quotas

affect the industry is difficult to say. The four fishers targeting fish for human consumption considered the quotas to have a negative impact on their economy:

> "*Now I never know if I can rent (quotas) from someone or where the quotas are going… so it (Finland's TAC) might go up in 2020, what if I buy quotas now, then I will have too much, and then the state will take it back if I cannot fish it",* – Commercial fisher

> *"…a clear limiting factor (the quotas)… I have bought my own equipment, my own water areas and I am doing everything myself, then suddenly this sets an upper limit for how much I can fish…",* – Commercial fisher

Herring and sprat fishing have been quite seasonal, therefore stakeholders hoped that the quota system would allow the fishing to be spread throughout the year. However, it was noted that environmental and other practical issues hinder this, especially during the warm summer months. Some however saw a possibility that increased demand and fish prices would allow for fishing of herring for human consumption during the summer months.

None of the interviewees considered the quota system to have an impact on the sustainability of the fish stocks, since the Finnish TAC is still decided on the basis of the same scientific evidence as before and the quotas are derived from that. Some also commented that during years with good catches, the market is the factor limiting the fishing since the demand and processing capacity is at such a low level. Approximately half of the participants saw some positive impacts on fishers work safety, at least in theory, while the other half were not convinced any changes would be seen in practice. Nonetheless, no negative impact was mentioned, the option of staying at the harbour during the worst storms without losing catch opportunities were appreciated, as well as reduced stress levels.

3.1.5 Quota savings

Quota saving, or bankable ITQs, were suggested as a method to fully or partly save quotas for the following year in return for an interest rate based on fish growth and reproduction potential. Of the fifteen participants, nine were of the opinion that a possibility for "quota saving" would be a welcomed addition. However, none considered the biological factors behind such a system as a strong argument, but

instead saw the advantages of it in terms of improved flexibility and business planning, e.g. in case of a vessel breakdown the quotas could be saved for next season. Four of the stakeholders immediately dismissed such a system since it would not theoretically be possible to combine with the current system.

3.1.6 Future prospects

The general perception was that the number of fishers will continue to reduce as a consequence of the high average age among fishers, lack of political will to support fisheries and as a natural development from modernising the fleet and processors facilities, and that the quota system did not have any major impact on this development. It is estimated that the trawling sector will continue its concentration into larger actors and, with the individual quotas implemented, allowing for more profitable companies. Opinions of the future for small-scale businesses varied. Some saw a positive development for fishers targeting quality fish, by forming larger units, developing their own market segment combined with an increasing demand for fish products for human consumption, they would secure their future.

> *"…there will most likely be three or four larger trap-net companies in this area, who will own a larger share of the quotas and utilize seasonal workers"* – Interest group

Other saw problems such as seals and the black cormorant, old age group and the low price for herring as obstacles for the future for small-scale fishers.

Eleven out of the fifteen participants considered the possibilities for newcomers to enter the fishing industry as weak, despite the managers efforts of keeping a door open for new fishers. The quotas were now seen as a further investment needed when entering the industry, on top of all other costs. Several stakeholders were also of the opinion that it is not a profitable business to enter. The Finnish system was also criticised by a couple stakeholders, saying that by saving 4% of the Finnish TAC to newcomers, the managers just further reduced the current fishers part of the catch. A couple of stakeholders also criticised the system because of the share saved for newcomers actually ended up being utilized by old fishers "*playing the system*".

Considering the fishers role in the new system, most stakeholder saw a positive effect in the form of fishers having more power over their own businesses. In general, most stakeholder had a positive view of the future of the Finnish fishery fleet, saying the

quota system enhances profitability and possibilities, all while a positive sign of an upswing in demand can be seen. Concerns for the trap-net community were visible, however for reasons other than the quota system. Nonetheless, some optimism was also detectable, with believes that the trap-net community is facing a structural transformation rather than a dismantling.

4 Discussion

When applying the CMO (Context + Mechanisms = Outcome) approach to the results of the interviews, an important explanatory factor is the context which within the mechanisms, i.e. the new management system, was implemented. Some of the key issues in the Finnish herring and sprat fisheries prior to the implementation of ITQs can be identified among the common drivers for advocating a catch share programme suggested by Bonzo et al. (2013). Based on these drivers, Table 3 merges the opinions regarding the situation in Finland both prior to and after the implementation of ITQs. According to the managers, Finland had an out-dated management system and a transfer into a new management regime had long been discussed and widely wished for. This, in combination of utilizing stakeholder meetings and public opinion polls, laid a solid foundation for the implementation of the individual quota system.

Table 3 The Finnish context prior to and after the implementation of ITQs, (Bonzon et al., 2013; Kulmala et al., 2007)

Economic and social drivers	***Finnish context, prior to ITQs***	***Finnish context, post ITQs***
Declining revenues	Considered one of the key issues and drivers for implementing a catch share programme.	Majority of stakeholder believe in increased overall revenues. On an individual level, both increase and decrease have been experienced.
"Race for fish"	Considered a problem and a negative attribute of the previous management regime.	Race removed, appreciated among all stakeholders, especially among fishers.
Overcapatilized fleet	Number of vessels and fishers considered too high for achieving sustainability.	Transferability and market mechanisms are now reducing the number of active vessels.
Excess gear deployment	Fishers had an incentive to maximise their share of the catch.	Fishers can better plan and optimize their catch per unit effort (CPUE)

Buy-out under consideration	Not under consideration but have previously been utilized.	Tradable quotas remove governments need to intervene.
Management costs exceeding revenues	Management was experienced complex, requiring managers to intervene frequently. Fishers expressed their wish to have more influence on the management.	Large parts of the management now rely on the system, less responsibility lies on the managers. Left to the fishers to manage their businesses according to the market.
Exceedingly complictated regulations	Previous system considered labour-intensive and out-dated. Time restrictions frequently used.	The system regulates itself. Some concerns of managers still interfering. Trawl and trap-net fishers have own quotas to utilize without time restrictions.
Desire for increased stability and predictability	Vessel or equipment breakdowns meant lost catch opportunities. Business strategy planed one year at a time.	Time for vessel and equipment repairs, catch can be divided more evenly throughout the year. Possibility for long-term business planning.
Significant safety concerns	Not considered a major problem but mentioned as one reasoning for the new system.	Stakeholders aware of the improvements in theory, not convinced of changes in practice.
Conflicts between different fishing sectors	Some conflicts between trawl and trap-net fishers, mainly regarding time restrictions.	Increased cooperation between the fishing methods, mainly due to the transferability of quotas.
Declining or unstable jobs	Jobs declining due to poor economics. Fishers high average age leads to more leaving the industry than newcomers arriving.	Jobs considered more stable due to the stability ITQs provide. New fishers possibility to enter the industry is still considered difficult despite managers efforts to create a more open industry.

An interesting aspect of the Finnish context is the privately-owned water areas, affecting mainly the coastal fishers. With the introduction of individual quotas, the state now regulates fishers catch on their own land, whereas before, fishers could freely fish as long as the TAC was not exceeded. This creates a peculiar situation and it will therefore be interesting to see how the coastal fishery segment will adapt to the changes.

The aims of the new management regime were, according to the managers, divided into three areas; economic, social and environmental. The outcomes will be discussed below.

4.1 Economic dimensions

The Finnish fishery fleet has long struggled with low profitability, hence the main focus entering the new management regime, as stated by the managers, was on improved economic performance. The bioeconomic modelling conducted by Kulmala et al. (2007) estimated an increase in profits after the implementation of ITQs due to a more efficient fleet structure and a policy that considers the properties of the Finnish Herring fishery. Moreover, the majority of fishers at that time believed in both increased profitability and decreased competition if a quota-based management system would be implemented. Similarly, the general belief among the stakeholders in this study was that increased economic efficiency has or will be achieved, and signs of such a development had already been experienced among some fishers.

On the other hand, some fishers found the system to restrict their businesses and had heard of fishers leaving the occupation due to not being allocated enough quotas. It is however important to remember that coincidentally the Finnish TAC limit for herring significantly decreased simultaneously to the introduction of ITQs, which according to Pálsson and Helgason (1995) and Olson (2011) particularly affects smaller companies, often forcing them to sell their quotas. However, the decreased competition in form of the removal of the "race-to-fish" was appreciated. Quota concentration was in 2007, as well as today, considered unavoidable but not necessarily a negative development, and a development that probably would have occurred regardless of the ITQ system.

Transferability is a key property of the system as it offers a voluntarily, market-based mechanism to decrease capital tied to the fishery. The opinions regarding transferability were more positive among stakeholders after than prior to the implementation of ITQs. In this study, the two stakeholders opposing transferability were mainly against the quotas going to foreign owners, otherwise it was seen as a positive attribute of the system. Kulmala et al. (2007) stated that an interesting question not studied at that time was how the managers viewed transferability. As of 2018, the managers considered transferability as a crucial factor for the optimization of the fleet and for enhancing profitability. Kulmala et al. (2007) estimated that some 30 vessels, approx. one-third of the fleet, would quit herring harvesting after the implementation of ITQs. As of this date, no such data is available and thus will be an interesting question for future studies and monitoring. However, all interview

participants had heard or been part of transactions where the selling party were terminating their business, showcasing that the system is functioning as it should.

By many seen as a necessary attribute, the Finnish ITQ system included safeguards designed to protect small-scale fishers. In Kulmala et al. (2007) study, the five fishers targeting fish for human consumption believed that the proportion of food herring of the total catch would increase with the implementation of ITQs. Further adding that the herring markets were the major regulating factor for food herring fisheries. In this study, none of the four food fishers experienced their share of the total catch to increase, on the contrary they were quite unhappy of their proportion of the quotas. Noteworthy is that several stakeholders mentioned the lack of herring suitable for human consumption as the regulating factor, rather than the herring markets. Two assumptions could be drawn from this; the demand for food herring has or is believed among stakeholders to increase, and, the number of large enough herring individuals has reduced since 2007 to such extent it has become a regulative factor.

4.2 Social dimensions

Gutiérrez et al. (2011) identified three attributes important for successful fisheries management: strong leadership, high social capital and an individual quota system. Fisheries management is to a large degree about managing human behaviour, thus acceptance of a management system is crucial for its success. In Kulmala et al. (2007) study, the majority of the fishers interviewed supported individual quotas as a management option. In 2015, the Ministry of Agriculture and Forestry conducted a survey where some 70% of the fishers supported a transfer towards ITQs. Accordingly, the opinions in 2018 towards the prevailing management system was mostly positive, indicating a successful management system in terms of social acceptance, i.e. a high social capital. Based on the comments from the interviewees, the Ministry of Agriculture and Forestry is considered a strong leading body despite part of the responsibility being transferred to the fishers. Therefore, one can suggest that with the recent introduction of individual quotas, Finland cover the three attributes necessary for a successful fisheries management.

According to Grainger and Costellos (2011) findings, user-rights, in comparison with property rights, tend to reflect as a weaker perceived security by the fishers. The

findings in this study suggest likewise with some of the stakeholder expressing their concerns towards the continuity of the system since it was initially implemented for ten years with a review after five years. The managers decision to utilize user-rights in an effort to hinder quota prices from escalating was in general perceived as acceptable and the ten-year time frame was considered long enough for subtle business planning, but nonetheless, some stakeholders wondered why initially only ten years and what will happen then. Same concerns were also reflected in the willingness to invest, e.g. in new equipment or quotas. Investments done in the beginning of the ten-year period was considered safer than by the end of the period, given that there is no guarantee for the systems continuation. This is an important issue directly affecting the perceived stability level of the system, and as such, adequate attention should be put on this topic for the upcoming review of the management system.

A couple stakeholders presented concerns regarding the managers adding various inputs to the system after the initial allocation of the individual quotas, saying that managers should fully commit to the system and stop intervening. This supports the claims made by Emery et al. (2012), that the overall structure of the system might be weakened if fishers' confidence in the systems stability is weakened.

In this study, the majority of stakeholders considered the method for the allocation of quotas as fair. The allocation was to a large extent executed with the same properties as to what the fishers considered the best alternatives in Kulmala et al. (2007) study. However, the fishers targeting food herring in 2007 emphasised that the quotas should be based on the value of the vessel and fishing equipment rather than previous catch. Accordingly, in this study it can be seen that the ones unsatisfied with the allocation process was the fishers targeting food herring, with the trawler saying allocations should have prioritised food fishers and trap-net fishers stating they should have been left outside the system. Interestingly, the managers stated that the trap-net fishers were included in the ITQ system according to their own wishes.

Similarly to the study in 2007, stakeholders today found it difficult, expensive and in some cases unprofitable for newcomers to enter the fishery industry. On the other hand, concerns expressed in 2007 regarding the future, e.g. low profitability and heavy restrictions, seem to have turned to more positive attitudes towards the future, indicating that the stakeholders are content with the current management system.

4.3 Environmental dimensions

The Baltic Sea has suffered a considerable amount of pollution and eutrophication throughout the years, also affecting the fish populations. Selling of herring has been significantly restricted in the EU due to the high concentration levels of dioxins, which naturally has had an impact on human consumption. In Kulmala et al. (2007) study, fishers expressed their worry towards the accumulation of environmental toxins in herring. The situation in 2018 was considered vastly improved, the dioxin levels have significantly reduced, and stakeholders believed that trend would continue. On the other hand, the increased seal and black cormorant populations were seen as significant threats for the trap-net fishers, however not affecting trawlers.

Unlike many fisheries implementing quota-based management, the Finnish herring and sprat fisheries were not struggling with overfishing. ITQ enables enhanced economic performance simultaneously as it keeps fish stocks at a sustainable level given the correct estimation of the TAC. With these two factors in mind, no stakeholder considered ITQs to have an impact on the size of herring and sprat fish stocks, since TAC is based on the same scientific evidence as previously. The concept of "quota saving" was treated the same way in this study as well as in Kulmala et al. (2007) study, with stakeholders saying that biological factors such as herring growth rate was considered too theoretical or meaningless but that the concept would be appreciated as a means for economic enhancement. It should be noticed, that the main purpose of a TAC system is to save fish for growth and reproduction, hence this saving increases the biomass of the stock, which could be compared to interest rates in bank savings.

5 Conclusions

In 2007, the majority of the Finnish commercial herring and sprat fishers considered the transformation towards market-based management as a preferable option and likewise, the majority of the stakeholders in 2018 were satisfied with the properties of the current management regime. In this study interviews were conducted to determine stakeholder opinions of the recently implemented management system for the Finnish herring and sprat fisheries. The successfulness of the system is thus measured through peoples' thoughts and opinions rather than other, more concrete performance data. The preparation of the Finnish ITQ system was conducted in cooperation with various

stakeholders and experiences from abroad were utilized. Given that the successfulness of a management system is highly dependent on the acceptance of its actors, it could be concluded that the implementation of the Finnish ITQ system has been a success. However, fishers should not be considered as a uniformed group of people but rather as several smaller groups or even individuals, all with their own opinions and values. Hence, there are also groups less content with the new management system, mainly among those who fish for quality rather than quantity which is an area that should be carefully taken into consideration by the managers in future developments. It shall therefore be interesting to see what form that segment is taking and whether a possible increase in the demand for food herring will have an effect on food targeting fisheries. The bulk of the Finnish herring and sprat catch will continue to be divided among fewer and larger actors, which are anticipated to operate with increased economic efficiency and stability. Future studies will determine whether this is true or not. Another interesting topic to study is the development of the quota prices in Finland and whether the actions taken by the managers will hinder the prices from sky rocketing. After such an extensive shift in the management regime, it will most likely take a few years before the Finnish herring and sprat fishery industry settles into a more stable form, however the industry now has a somewhat more positive attitude towards the future.

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Appendix 1

Stakeholder interviews, herring and sprat, 2018

Q1: Do you consider ITQs as the correct management method for the Finnish commercial herring and sprat fisheries?
Q2: What are your opinions regarding the quota allocation procedure?
Q3: Has the ITQ system caused any changes in the fishery fleet?
Q4: Quotas are assigned for a period of ten years, possibility to prolong with five years. What are your opinions regarding these time periods?
Q5: How do you believe ITQs affect fishing businesses economy?
Q6: How do you believe ITQs affect the competition within the fishery industry?
Q7: How do you believe ITQs affect the fish stocks?
Q8: How do you believe ITQs affect work safety?
Q9: Do you see any differences in how the ITQ system treat large- and small-scale fisheries? Differences between fishing methods (trawl/trap-net)?
Q10: How does the future look like for the small-scale fisheries, in context of the ITQ system?
Q11: Do you believe employment within the industry will change due to the ITQs?
Q12: How do you see that possible newcomers have been considered in the new ITQ system?
Q13: How do you feel about the option to sell quotas (transferable quotas)?
Q14: How do you think the selling/buying of quotas should be arranged?
Q15: Has the fishers role/position changed due to the new system?
Q16: How do you believe the future of the Finnish fishery fleet looks like, in the light of the new management system?
Q17: “Quota saving”, is it something that would interest you?